Final Report

Arizona Grain Research and Promotion Council

August, 2004

Testing Low Input Barley and Wheat Lines

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TITLE: Testing low input barley and wheat lines

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DURATION: November, 2003 to November, 2004

SUMMARY: This work represents the third year of a 3-year testing program to identify low input wheat and barley entries with higher test weight and less lodging than Solum barley. Twenty lines each of barley and wheat were grown at the Maricopa Agricultural Center with one, two, or seven irrigations. Several barley entries yielded similar to Solum but had higher test weight and less lodging. Several wheat entries exhibited good yield potential, test weight, and lodging resistance.

BACKGROUND: The low input barley line, Solum, was released in 1992 by Dr. Tom Ramage. Dr. Ramage continued his breeding work with low input barley after Solum was released, and also worked with low input wheat. Dr. Ramage retired in 1999 and left me with over 200 barley and wheat lines adapted to water stress conditions. These lines were screened in 2001, and 20 selected wheat and barley lines were tested in 2002 and 2003 grown with one, two, or seven irrigations. These 20 lines were tested again in 2004.

OBJECTIVES: Identify low input barley and wheat lines that have less lodging and higher test weight than Solum but have equal or better grain yield.

DESCRIPTION OF THE WORK: Low input barley (20 lines) and wheat (20 lines) plus four check varieties were evaluated in Field 6 at the Maricopa Agricultural Center during the 2002-2003 growing season. The soil type was a Casa Grande sandy clay loam. The previous crop was sudangrass. The surface 6 inches of soil was sampled before planting and contained 7.7 ppm NO_3-N and 6.5 ppm P. Low input barley and wheat lines were planted in 5 ft x 16 ft plots on December 3, 2002. The seeding rate was variable depending on the irrigation regime (Table 1). An irrigation to germinate the seed was applied on December 3 and subsequent irrigations were applied at various times depending on the irrigation regime (Table 1). Fertilizer was applied preplant as ammonium phosphate sulfate (16-20-0) at a rate of 48 lbs N/acre and 60 lbs P_2O_5/acre. Nitrogen fertilizer was applied at of rate of 23 lbs N/acre as urea (45-0-0) on 29 Jan for the two- and seven-irrigation regime. Nitrogen fertilizer was applied to the seven-irrigation regime at a rate of 55 lbs N/acre as urea (45-0-0) on 1 Mar and 46 lbs N/acre on 18 Mar and 2 Apr (Table 1). Heading, flowering, maturity, plant height, and lodging were noted before harvest. A small plot combine was used to harvest the grain at variable dates depending on the irrigation regime (Table 1). The grain was weighed and yield was estimated. Barley grain samples were cleaned by running through a head thresher, and wheat grain samples were cleaned by running through a seed cleaner once. Test weight was determined from these cleaned samples using a 1-pint container.

RESULTS: This was a poor growing season for full input (7 irrigations) small grains, but yields for low input (1 and 2 irrigation) small grains were near normal. Total precipitation was near the average for the growing season (Table 2). Growing season temperature was near or above average. However, the defining characteristic of this growing season was the hottest March on record at all locations. This, combined with one of the coldest February on record, resulted in hot temperatures occurring earlier than usual and may have been responsible for the lower yields measured this year this year in the full input small grains.

Grain yield and other characteristics of the entries varied depending on irrigation number (Tables 3 and 4). Grain yields averaged 1754, 2679, and 4260 lbs/acre with one, two, and seven irrigations, respectively. This year, the 2-irrigation regime most accurately reflects the environment intended for these entries. The 7-irrigation regimes had excessive lodging, which is good for screening purposes.

When grown with one or two irrigations, Solum was among the top ten highest yielding entries in the barley and wheat tests (Tables 5 and 6). However, Solum was among the lowest in test weight and highest in lodging. Several barley entries had yields similar to Solum with one or two irrigations, but had higher test weight and less lodging. The barley entry 2 was consistently the highest yielder in these tests, but barley entry 9, a two-row barley was a top yielder and has better test weight and lodging resistance.

Several wheat entries are promising. Wheat entry 11 has the highest yield, but has relatively low test weight. Xeric is also a top yielder, but has relatively low test weight and lodging resistance. Wheat entry 12, a hard red, is a good yielder and near the top in test weight and lodging resistance.

ACKNOWLEDGMENTS: The technical assistance of Melinda Main is greatly appreciated.

Table 1. Cultural information for the various irrigation regimes.

	One irrigation	Two irrigations	Seven irrigations
Seeding rate (lbs/acre)	20	40	80
Nitrogen rate (lbs N/A)	48	71	218
Irrigation dates	03 Dec 03	03 Dec 03 29 Jan 04	03 Dec 03 29 Jan 04 01 Mar 04 18 Mar 04 02 Apr 04 16 Apr 04 30 Apr 04
Harvest dates	06 May 04	07 May 04	13 May 04

Table 2. Climatic data for Maricopa during the 2004 growing season compared to the long-term average. The rankings of the months in the 18 years of data are from low to high. The climate data was obtained from AZMET.

Climate variable	Unit	Year(s)	Dec	Jan	Feb	Mar	Apr	May	Dec-May
Max	Rank of 18	2004	14	13	3	18	9	14	14
Temp.	ºF	2004	67	67	66	84	84	97	78
	ºF	1987-2004	65	66	70	77	85	94	76
Min	Rank of 18	2004	10	15	3	18	13	11	14
Temp.	ºF	2004	34	39	36	51	52	60	45
	ºF	1987-2004	35	36	39	44	51	59	44
Ppt.	Rank of 18	2004	7	12	10	8	15	1	12
	inches	2004	0.16	0.71	0.91	0.28	0.98	0.00	3.03
	inches	1987-2004	0.64	0.66	0.81	0.75	0.31	0.14	3.27

Table 3a. Grain yield and other characteristics of the barley lines grown with one irrigation.

Crop	Irrigations	Entry	Grain yield	Test weight	Plant height	Lodging	Heading	Anthesis	Maturity
			lbs/A	lbs/bu	inches	%			
Barley	1	1	1429	48.8	29	15	3/01	3/05	4/15
Barley	1	2	1898	51.8	35	6	3/06	3/08	4/17
Barley	1	3	1609	48.6	36	11	3/05	3/08	4/12
Barley	1	4	1647	53.0	30	0	3/15	3/16	4/18
Barley	1	5	1923	46.5	33	12	3/04	3/05	4/11
Barley	1	6	1829	50.9	29	5	3/02	3/04	4/18
Barley	1	7	1516	46.8	33	16	3/06	3/08	4/10
Barley	1	8	1886	47.3	32	11	3/03	3/05	4/15
Barley	1	9	2099	52.3	30	0	3/15	3/16	4/17
Barley	1	10	1880	48.8	31	8	3/06	3/08	4/13
Barley	1	11	1874	48.6	33	5	2/28	3/05	4/10
Barley	1	12	1628	50.0	34	10	3/02	3/05	4/18
Barley	1	13	1913	49.4	30	23	3/01	3/05	4/11
Barley	1	14	1990	52.5	32	0	3/14	3/17	4/16
Barley	1	15	2082	53.6	33	1	3/14	3/16	4/18
Barley	1	16	2241	52.3	31	1	3/14	3/15	4/17
Barley	1	17	2182	52.8	30	1	3/15	3/17	4/17
Barley	1	18	1514	50.6	34	7	3/08	3/09	4/14
Barley	1	19	1828	47.0	32	8	3/09	3/10	4/16
Barley	1	20	1577	47.6	33	20	2/27	3/03	4/17
Barley	1	Solum	2055	42.9	34	50	3/05	3/07	4/11
Barley	1	Barcott	1828	42.9	27	0	3/06	3/08	4/13
Barley	1	Xeric	1872	58.1	33	0	3/13	3/16	4/18
Barley	1	Y. rojo	1597	58.6	22	0	3/13	3/17	4/17
Avg.			1829	50.3	31	9	3/07	3/09	4/14
LSD(5%)			356	1.6	3	9	---	---	---

Table 3b. Grain yield and other characteristics of the barley lines grown with two irrigations.

Crop	Irrigations	Entry	Grain yield	Test weight	Plant height	Lodging	Heading	Anthesis	Maturity
			lbs/A	lbs/bu	inches	%			
Barley	2	1	2643	51.8	32	20	2/29	3/05	4/14
Barley	2	2	3360	54.4	38	8	3/06	3/08	4/18
Barley	2	3	1574	53.1	41	3	3/05	3/08	4/10
Barley	2	4	2252	54.1	36	1	3/14	3/15	4/17
Barley	2	5	2546	52.5	38	8	3/04	3/05	4/12
Barley	2	6	2911	53.4	31	0	3/01	3/16	4/18
Barley	2	7	2506	51.9	37	7	3/06	3/08	4/11
Barley	2	8	2893	50.1	36	17	3/02	3/06	4/13
Barley	2	9	2802	53.7	33	1	3/15	3/16	4/16
Barley	2	10	2956	51.6	33	0	3/06	3/08	4/13
Barley	2	11	3654	52.4	32	5	2/27	3/03	4/12
Barley	2	12	1896	52.8	38	8	3/02	3/04	4/17
Barley	2	13	3354	51.5	26	8	3/01	3/04	4/16
Barley	2	14	2516	53.5	32	0	3/13	3/16	4/16
Barley	2	15	2787	54.4	36	5	3/14	3/15	4/07
Barley	2	16	2572	55.1	35	1	3/13	3/14	4/18
Barley	2	17	2177	55.4	34	0	3/15	3/17	4/17
Barley	2	18	2270	54.4	39	9	3/06	3/08	4/13
Barley	2	19	2624	49.7	37	18	3/09	3/06	4/13
Barley	2	20	2962	52.3	35	23	2/27	3/03	4/12
Barley	2	Solum	2826	49.0	37	65	3/04	3/07	4/10
Barley	2	Barcott	2419	48.4	27	1	3/05	3/08	4/11
Barley	2	Xeric	3387	59.1	40	0	3/12	3/17	4/20
Barley	2	Y. rojo	3053	60.9	26	0	3/13	3/16	4/19
Avg.			2706	53.2	35	9	3/06	3/09	4/14
LSD(5%)			575	1.4	5	8	---	---	---

Table 3c. Grain yield and other characteristics of the barley lines grown with seven irrigations.

Crop	Irrigations	Entry	Grain yield	Test weight	Plant height	Lodging	Heading	Anthesis	Maturity
			lbs/A	lbs/bu	inches	%			
Barley	7	1	3663	50.6	36	76	2/24	3/05	4/22
Barley	7	2	4869	51.9	40	59	3/05	3/08	4/25
Barley	7	3	2968	50.7	41	65	3/05	3/09	4/22
Barley	7	4	4831	53.5	38	43	3/13	3/14	4/23
Barley	7	5	3356	49.9	41	58	3/05	3/08	4/18
Barley	7	6	5401	50.6	35	60	3/10	3/05	4/24
Barley	7	7	3127	50.4	40	38	3/07	3/09	4/18
Barley	7	8	3983	49.3	35	75	3/02	3/06	4/23
Barley	7	9	5163	53.3	39	45	3/04	3/15	4/23
Barley	7	10	4589	49.9	37	71	3/06	3/09	4/23
Barley	7	11	4394	51.0	36	45	2/27	3/03	4/18
Barley	7	12	3831	50.0	37	43	3/02	3/04	4/23
Barley	7	13	4363	50.1	36	75	3/01	3/04	4/22
Barley	7	14	5195	54.0	36	39	3/14	3/15	4/22
Barley	7	15	4938	55.0	39	54	3/14	3/15	4/25
Barley	7	16	4869	52.5	38	45	3/15	3/16	4/22
Barley	7	17	5341	53.3	39	35	3/15	3/17	4/23
Barley	7	18	4373	51.8	42	46	3/06	3/08	4/22
Barley	7	19	4636	47.0	38	64	3/09	3/10	4/23
Barley	7	20	3752	49.8	38	78	2/27	3/03	4/18
Barley	7	Solum	3738	47.1	40	88	3/05	3/07	4/18
Barley	7	Barcott	4481	49.5	34	45	3/07	3/08	4/22
Barley	7	Xeric	5053	60.8	40	53	3/13	3/20	4/26
Barley	7	Y. rojo	4926	62.8	32	0	3/15	3/20	4/25
Avg.			4410	52.3	38	54	3/06	3/09	4/22
LSD(5%)			637	1.4	4	25	---	---	---

Table 4a. Grain yield and other characteristics of the wheat lines grown with one irrigation.

Crop	Irrigations	Entry	Grain yield	Test weight	Plant height	Lodging	Heading	Anthesis	Maturity
			lbs/A	lbs/bu	inches	%			
Wheat	1	1	1617	55.3	33	0	3/08	3/14	4/18
Wheat	1	2	1843	56.0	40	0	3/05	3/10	4/16
Wheat	1	3	1616	57.5	39	0	3/07	3/11	4/18
Wheat	1	4	1308	55.5	37	0	3/06	3/09	4/13
Wheat	1	5	1764	56.4	31	0	3/05	3/10	4/15
Wheat	1	6	1732	56.0	34	0	3/04	3/12	4/14
Wheat	1	7	1752	56.1	36	0	3/10	3/15	4/16
Wheat	1	8	1911	58.8	32	0	3/04	3/11	4/17
Wheat	1	9	1668	56.3	34	0	3/07	3/11	4/15
Wheat	1	10	1656	55.2	38	0	3/05	3/10	4/14
Wheat	1	11	1729	53.1	32	0	3/08	3/12	4/15
Wheat	1	12	2150	56.2	29	0	3/08	3/13	4/16
Wheat	1	13	1386	58.2	41	0	3/07	3/11	4/16
Wheat	1	14	1380	54.5	37	0	3/05	3/09	4/14
Wheat	1	15	1588	53.8	32	0	3/08	3/12	4/15
Wheat	1	16	1657	58.6	29	0	3/06	3/11	4/16
Wheat	1	17	1470	58.5	39	0	3/04	3/10	4/17
Wheat	1	18	1899	53.0	34	0	3/09	3/13	4/16
Wheat	1	19	1456	57.7	34	0	3/06	3/09	4/18
Wheat	1	20	1393	57.1	36	0	3/04	3/10	4/18
Wheat	1	Solum	1778	44.8	36	45	3/05	3/08	4/08
Wheat	1	Barcott	1888	44.8	27	0	3/06	3/07	4/17
Wheat	1	Xeric	1999	57.7	33	0	3/12	3/17	4/18
Wheat	1	Y. rojo	1639	58.6	23	0	3/13	3/18	4/14
Avg.			1678	55.7	34	2	3/06	3/11	4/15
LSD(5%)			384	1.6	4	6	---	---	---

Table 4b. Grain yield and other characteristics of the wheat lines grown with two irrigations.

Crop	Irrigations	Entry	Grain yield	Test weight	Plant height	Lodging	Heading	Anthesis	Maturity
			lbs/A	lbs/bu	inches	%			
Wheat	2	1	2961	58.6	38	0	3/06	3/13	4/18
Wheat	2	2	2045	59.2	41	0	3/05	3/10	4/16
Wheat	2	3	2506	59.9	44	0	3/06	3/13	4/16
Wheat	2	4	1953	59.5	40	0	3/05	3/10	4/17
Wheat	2	5	2936	60.9	37	0	3/05	3/12	4/19
Wheat	2	6	2969	60.4	36	0	3/04	3/11	4/19
Wheat	2	7	2494	58.3	41	0	3/10	3/14	4/18
Wheat	2	8	2690	61.2	37	0	3/04	3/10	4/18
Wheat	2	9	2574	59.4	40	0	3/06	3/12	4/19
Wheat	2	10	2762	59.2	38	0	3/05	3/10	4/17
Wheat	2	11	3447	57.9	38	0	3/06	3/12	4/17
Wheat	2	12	3514	61.4	35	0	3/08	3/12	4/17
Wheat	2	13	1013	59.1	44	0	3/06	3/12	4/18
Wheat	2	14	2541	59.9	42	0	3/05	3/10	4/19
Wheat	2	15	2961	59.8	36	0	3/06	3/12	4/15
Wheat	2	16	2621	61.9	34	0	3/05	3/10	4/17
Wheat	2	17	1528	61.1	42	0	3/04	3/04	4/17
Wheat	2	18	3105	54.4	39	0	3/10	3/16	4/18
Wheat	2	19	2647	60.1	41	0	3/05	3/12	4/19
Wheat	2	20	1866	60.1	39	0	3/04	3/10	4/19
Wheat	2	Solum	3134	49.7	37	72	3/04	3/08	4/11
Wheat	2	Barcott	2947	49.9	27	0	3/05	3/08	4/12
Wheat	2	Xeric	3089	58.4	39	0	3/12	3/16	4/18
Wheat	2	Y. rojo	3340	61.1	28	0	3/13	3/17	4/19
Avg.			2652	58.8	38	3	3/06	3/11	4/17
LSD(5%)			399	1.6	3	1	---	---	---

Table 4c. Grain yield and other characteristics of the wheat lines grown with seven irrigations.

Crop	Irrigations	Entry	Grain yield	Test weight	Plant height	Lodging	Heading	Anthesis	Maturity
			lbs/A	lbs/bu	inches	%			
Wheat	7	1	5026	61.6	41	23	3/09	3/15	4/24
Wheat	7	2	3332	59.8	46	23	3/06	3/10	4/23
Wheat	7	3	4115	61.6	46	83	3/10	3/12	4/23
Wheat	7	4	2918	60.4	42	15	3/05	3/10	4/25
Wheat	7	5	3956	61.3	39	46	3/08	3/13	4/25
Wheat	7	6	4462	62.2	37	83	3/06	3/13	4/24
Wheat	7	7	3926	61.2	43	21	3/11	3/17	4/26
Wheat	7	8	4195	62.6	39	34	3/04	3/08	4/24
Wheat	7	9	3572	61.3	39	35	3/08	3/12	4/25
Wheat	7	10	4260	61.3	38	46	3/06	3/12	4/26
Wheat	7	11	5621	61.7	38	9	3/09	3/15	4/27
Wheat	7	12	4792	62.5	36	20	3/09	3/15	4/27
Wheat	7	13	2690	60.6	43	80	3/08	3/13	4/23
Wheat	7	14	4703	62.4	44	40	3/05	3/11	4/21
Wheat	7	15	4284	63.5	37	61	3/09	3/13	4/24
Wheat	7	16	2072	62.9	38	3	3/08	3/12	4/22
Wheat	7	17	2598	62.1	44	31	3/05	3/12	4/24
Wheat	7	18	5398	62.0	38	58	3/10	3/18	4/24
Wheat	7	19	3987	61.2	42	8	3/06	3/12	4/25
Wheat	7	20	3346	61.9	40	26	3/05	3/09	4/21
Wheat	7	Solum	3834	50.1	38	86	3/05	3/08	4/20
Wheat	7	Barcott	4774	52.5	32	25	3/06	3/08	4/25
Wheat	7	Xeric	5271	61.8	42	21	3/13	3/21	4/26
Wheat	7	Y. rojo	5482	64.0	31	0	3/15	3/21	4/27
Avg.			4109	61.0	40	36	3/07	3/12	4/24
LSD(5%)			645	0.9	4	26	---	---	---

Table 5. Ranking of **barley** entries for grain yield, test weight, lodging, and physiological maturity. The entries are sorted by average yield ranking for all years and were grown with various numbers of irrigations. The average ranking for grain yield denoted by "1,2" refers to the average for the 1- and 2-irrigation regimes for the three years.

	Grain Yield														Test weight							Lodging							Maturity						
	2002			2003			2004			Average					2004			Average				2004			Average				2004			Average			
	Irrigations														Irrigations							Irrigations							Irrigations						
Entry	1	2	7	1	2	7	1	2	7	04	03	02	all	1,2	1	2	7	04	03	02	all	1	2	7	04	03	02	all	1	2	7	04	03	02	all
2	1	1	9	1	1	3	9	3	8	2	1	1	1	1	9	7	9	9	8	7	8	12	15	15	15	13	7	12	17	21	22	21	21	13	21
13	7	3	17	3	3	16	8	4	16	10	6	3	2	2	13	20	16	16	22	17	19	23	17	21	21	19	13	19	4	15	9	8	4	2	5
9	5	4	5	21	20	9	3	11	4	1	17	2	3	6	7	9	6	8	3	5	4	4	9	9	6	5	17	9	17	15	16	17	18	22	22
11	9	6	16	10	2	14	12	1	14	9	8	6	4	4	17	15	11	14	19	21	18	11	13	9	10	17	21	16	2	7	3	3	1	3	2
Solum	2	5	18	5	4	10	5	10	20	13	4	8	5	3	23	23	23	23	21	24	23	24	24	24	24	24	24	24	4	3	3	2	5	1	3
10	6	2	14	4	11	17	11	7	12	11	11	4	6	5	14	19	18	17	23	19	21	14	4	19	12	12	4	10	8	11	16	11	17	12	12
6	19	12	13	11	5	8	14	8	1	5	7	17	7	10	10	11	14	11	10	14	11	11	4	16	9	2	3	4	22	21	20	23	12	17	18
15	3	13	4	19	16	20	4	12	6	4	21	7	8	8	3	5	3	3	5	3	3	9	13	13	11	11	12	11	22	1	22	15	20	16	17
17	5	9	11	17	22	15	2	22	2	8	20	5	9	11	5	3	7	4	4	9	5	8	4	2	3	3	8	3	17	18	16	18	15	21	19
14	14	21	3	16	17	12	6	17	3	7	14	14	10	18	6	10	4	7	6	6	6	4	4	4	2	7	6	5	13	15	9	12	10	18	11
8	18	19	8	6	6	1	10	9	17	14	2	19	11	9	19	21	22	21	14	16	17	18	20	21	20	20	19	21	11	11	16	13	22	15	16
19	8	11	19	15	14	2	16	14	11	15	10	10	12	13	20	22	24	22	24	23	24	15	21	17	19	21	23	22	13	11	16	14	19	11	14
1	15	10	12	9	7	6	24	13	21	20	5	11	13	12	15	18	13	15	13	15	13	20	22	22	22	15	16	18	11	13	9	10	8	14	10
16	16	17	6	13	23	19	1	15	9	6	22	9	14	14	8	4	8	6	7	8	7	7	7	9	7	6	9	6	17	21	9	16	14	20	15
Xeric	22	22	2	12	19	13	13	2	5	3	13	21	15	17	2	2	2	2	2	1	2	4	4	12	5	8	1	2	22	24	24	24	24	24	24
Barcott	21	18	1	2	10	4	16	19	13	19	3	20	16	16	24	24	21	24	18	22	22	4	10	9	8	10	5	8	8	5	9	6	6	8	6
20	13	8	15	8	8	11	21	6	19	17	9	16	17	7	18	16	20	19	12	12	14	22	23	23	23	23	22	23	17	7	3	7	7	9	8
4	17	16	7	20	24	5	17	21	10	18	16	12	18	23	4	8	5	5	9	10	9	4	9	6	4	9	10	7	22	18	16	19	16	19	20
Y. rojo	24	24	24	14	15	7	20	5	7	12	12	24	19	22	1	1	1	1	1	2	1	4	4	1	1	1	2	1	17	23	22	22	23	23	23
12	20	7	22	22	12	18	18	23	18	22	18	13	20	21	12	13	17	13	15	18	15	16	17	6	14	4	18	13	22	18	16	20	13	10	13
18	11	14	10	7	21	24	23	20	15	21	19	15	21	19	11	6	10	10	11	4	10	13	19	11	16	22	14	17	9	11	9	9	9	6	9
5	12	15	21	23	13	22	7	16	22	16	23	18	22	15	22	14	19	20	16	13	16	19	17	14	18	18	20	20	4	7	3	4	3	5	4
7	10	20	20	18	9	21	22	18	23	23	15	22	23	20	21	17	15	18	20	20	20	21	14	3	13	14	11	14	2	5	3	1	2	4	1
3	23	23	23	24	18	23	19	24	24	24	24	23	24	24	16	12	12	12	17	11	12	18	11	18	17	16	15	15	6	3	9	5	11	7	7

Table 5. Ranking of **wheat** entries for grain yield, test weight, lodging, and physiological maturity. The entries are sorted by average yield ranking for all years and were grown with various numbers of irrigations. The average ranking for grain yield denoted by "1,2" refers to the average for the 1- and 2-irrigation regimes for the three years.

	Grain Yield														Test weight							Lodging							Maturity						
	2002			2003			2004			Average					2004			Average				2004			Average				2004			Average			
	Irrigations														Irrigations							Irrigations							Irrigations						
Entry	1	2	7	1	2	7	1	2	7	04	03	02	all	1,2	1	2	7	04	03	02	all	1	2	7	04	03	02	all	1	2	7	04	03	02	all
11	4	2	3	5	3	3	11	2	1	4	2	3	1	2	21	21	12	22	19	18	20	12	12	4	4	6	15	7	9	9	23	14	21	15	18
Barcott	13	4	8	2	1	5	5	10	7	6	1	5	2	3	23	23	23	23	23	23	23	12	12	11	11	16	19	17	18	2	16	10	1	2	2
Xeric	5	9	1	9	15	4	2	6	4	2	7	4	3	7	7	19	11	13	22	19	18	12	12	8	8	13	16	13	22	15	20	23	24	24	24
12	11	6	4	1	16	2	1	1	6	1	6	7	4	4	12	2	5	5	7	11	6	12	12	6	6	11	10	8	14	9	23	18	17	9	16
1	3	7	2	3	7	6	16	9	5	10	3	1	5	5	17	18	14	16	15	16	16	12	12	10	10	9	13	10	22	15	11	20	20	21	22
18	2	5	6	8	24	1	4	5	3	3	12	2	6	8	22	22	9	21	20	22	22	12	12	19	19	18	23	22	14	15	11	13	22	22	21
Y. rojo	6	12	5	4	5	8	15	3	2	5	5	9	7	6	2	4	1	1	6	4	4	12	12	1	1	1	4	1	5	21	23	22	23	23	23
Solum	1	1	12	6	2	9	7	4	17	9	4	8	8	1	24	24	24	24	24	24	24	24	24	24	24	24	24	24	1	1	1	1	3	1	1
15	16	3	7	7	10	12	18	9	10	12	8	6	9	9	20	12	2	11	4	8	7	12	12	20	20	19	20	21	9	3	11	2	16	4	5
6	9	18	10	12	11	7	10	7	9	7	10	13	10	10	15	7	7	7	13	15	13	12	12	23	23	20	12	20	5	21	11	11	7	17	13
5	11	20	11	13	9	13	8	11	15	11	13	11	11	11	10	6	16	9	11	14	11	12	12	18	18	15	22	19	9	21	16	16	19	13	17
14	7	15	20	10	12	10	23	17	8	19	11	12	12	14	19	10	6	12	3	9	8	12	12	16	16	17	8	15	5	21	3	6	5	3	3
16	21	14	9	11	4	14	13	15	24	20	9	14	13	12	3	1	3	2	1	3	1	12	12	2	2	2	3	2	14	9	4	5	9	14	8
8	22	23	13	20	6	18	3	13	12	8	15	22	14	15	1	3	4	3	2	2	2	12	12	14	14	3	2	3	18	15	11	15	2	12	9
10	14	13	19	19	8	15	14	12	11	13	14	18	15	13	18	16	15	17	17	17	17	12	12	18	17	8	14	14	5	9	20	8	13	11	12
9	19	8	14	17	18	20	12	16	18	15	19	15	16	16	11	14	17	14	10	10	12	12	12	15	15	21	9	16	9	21	16	17	8	5	10
7	8	22	16	16	21	16	9	19	16	14	18	20	17	17	13	20	19	20	18	20	19	12	12	8	7	12	17	12	14	15	20	21	14	20	20
3	15	17	15	18	20	11	17	18	13	18	17	17	18	20	8	11	13	10	14	12	14	12	12	23	22	22	21	23	22	5	6	7	18	16	15
19	17	21	17	14	14	19	20	14	14	17	16	23	19	19	6	8	18	8	8	13	9	12	12	3	3	5	11	4	22	21	16	24	12	19	19
4	13	10	21	23	17	22	24	21	21	23	23	10	20	21	16	13	21	18	16	5	15	12	12	5	5	10	5	5	2	9	16	4	10	6	4
2	18	19	23	22	13	23	6	20	20	16	21	21	21	18	14	15	22	19	21	21	21	12	12	10	9	7	18	11	14	5	6	3	15	7	6
17	20	11	22	21	23	17	19	23	23	22	22	16	22	22	4	5	8	4	5	1	3	12	12	13	13	14	1	9	18	9	11	12	6	8	7
20	24	24	18	15	19	21	21	22	19	21	20	24	23	23	9	9	10	6	9	7	5	12	12	12	12	4	7	6	22	21	3	19	4	18	14
13	23	16	24	24	22	24	22	24	22	24	24	19	24	24	5	17	20	15	12	6	10	12	12	21	21	23	6	18	14	15	6	9	11	10	11